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THE GENUS SYNTHLIPSIS (CRUCIFERAE)

REED C. ROLLINS

Accepted genera of the Cruciferae are often very closely related to one another and it is never quite safe to take for granted the unequivocal reference of a given species to a particular genus. This situation frequently makes the problem of generic limits a particularly difficult one and it is often the case that a given species may be recognized without difficulty, while the reasonable placement of it in a genus is a matter of considerable uncertainty. The problem-species, in this respect, are the ones somewhat at the fringe of the genus and which have characteristics that deviate from those possessed by the more centrally located species. While these species are problems to the classificationist, they are at the same time crucially important to the evolutionist who searches for evidences of the pathways by which genera may be interconnected and thus display possible evolutionary lines linking one genus with another.

In studying the genus *Lesquerella*, I have sought to discover the connections of this genus with others in the family and one of the most obvious is that shown by *L. lasiocarpa* with *Synthlipsis* (cf. Rollins, 1955). In the earlier literature, this relationship is pointed up by the fact that Gray (1859) originally described *L. lasiocarpa* var. *Berlandieri* as

Synthlipsis Berlandieri. Furthermore, the inadequacy of material, coupled with the wide range of variation present in *L. lasiocarpa* as a whole, misled Watson (1882) into describing *Synthlipsis heterochroma* and *S. Berlandieri* var. *hispida*. The variants thus recognized by Watson are now accommodated in the four varieties of *L. lasiocarpa* (Rollins, l.c.), but it is more than probable that the last word on the taxonomy of the group has not been written. Additional material, particularly from eastern Mexico, should ultimately provide a more adequate basis for an understanding of this particular species in its entirety. In any event, the tie between the genera *Lesquerella* and *Synthlipsis* is clearly revealed through the characteristics of what is now called *Lesquerella lasiocarpa*.

In considering *Synthlipsis* alone, one of the major questions has been whether, with its single species, it did in fact, represent a genus sufficiently different from other genera of the family to merit continued recognition. Earlier (Rollins, 1939), we presented evidence for retaining *Synthlipsis* as against merging *Nerisyrenia* with it. In reviewing this evidence, I am less firmly convinced that the bases for keeping *Synthlipsis* and *Nerisyrenia* apart are unequivocal because some of the differences previously enumerated do not stand up in light of the data obtained from more recent collections of *Synthlipsis*. We are still in need of a broader spectrum of information than is at present available or even possible until further material is obtained. However, it does not seem probable that the merging of *Nerisyrenia* with *Synthlipsis* will be fully supported even with more material for study.

Up to the present, it has not been possible to consider the genus *Synthlipsis* in any context different from that of a single known species, *S. Greggii*. However, in the last few years considerable additional material of the genus has been collected, bringing to light two previously undescribed species. The siliques of all three species are strongly compressed at right angles to the replum, they are carinate-margined, possess a deep V- or U-shaped notch at the apex

and are densely pubescent with multiple-branched trichomes. These and other characteristics provide the members of the genus with a certain unity not shared by any other known species of the Cruciferae.

One of the new species described below, *Synthlipsis elata*, shows some resemblance in general habit to *Mancoa pubens*. This led to a consideration of the position of *M. pubens* in *Mancoa* and opened the question as to its possible inclusion as a member of *Synthlipsis*. However, *M. pubens*, although a somewhat anomalous species in *Mancoa*, seems better left in that genus for the present.

The following synopsis brings up to date the information we have concerning the genus *Synthlipsis*.

KEY TO THE SPECIES

Infructescences elongated, 1-4 dm. long; caudex not thick and heavily clothed with old leaf-bases; sinus at base of style open; styles pubescent or glabrous.

Siliques 2.5-3.5 mm. wide, narrowly oblong; ovules 15-25 in each locule; petals obovate, 4-5 mm. long ..... 1. *S. elata.*

Siliques 6-8 mm. wide, broadly elliptical; ovules 7-11 in each locule; petals broadly obovate, 9-12 mm. long. ..... 2. *S. Greggii.*

Infructescences compact, 2-5 cm. long; roots thick, caudex clothed with old leaf-bases; sinus at base of style narrow, nearly closed; styles glabrous throughout ..... 3. *S. densiflora.*

1. **Synthlipsis elata** Rollins, sp. nov. Fig. 1A-1F.

Annual; stems erect, divaricately branched from base upward, densely pubescent with dendritically branched trichomes, 4-6 dm. long; branches ascending; lower leaves narrowed at base, scarcely petiolate, 5-10 cm. long; 1-2 cm. wide; upper leaves sessile, 2-4 cm. long, 5-8 mm. wide; all leaves irregularly dentate to nearly pinnate, densely pubescent with stellate and dendritic trichomes, strongly 1-nerved on the lower surface, narrowly oblong, acute; inflorescence racemose, elongating in fruit, 1-3 dm. long; sepals nonsaccate, oblong, densely pubescent, ca. 2.5 mm. long, ca. 1.2 mm. wide; petals white, obovate, differentiated into blade and claw, entire, not dilated below, 4-5 mm. long, 2-2.5 mm. wide; filaments not dilated at base, 4-5 mm. long; anthers ca 1.5 mm. long; pedicels divaricately ascending, straight, densely pubescent, very slightly expanded at summit, 6-10 mm. long; siliques narrowly oblong, strongly compressed at right angles to septum, carinate-margined, notched at apex, densely pubescent, 8-12 mm. long,

FIG. 1. *Synthlipsis elata* Rollins. A — habit sketch of upper portion of plant, × ½; B — flower with some parts removed and single petal, × 3; C — mature silique, × 3; D — replum, × 3; E — seeds, × 5; one seed in cross-section to show cotyledon position in one of the most compressed types, × 10; F — trichomes, × 25.

2.5-3.5 mm. wide, apical notch V-shaped, shoulders acute; styles slender, pubescent at base, 2-2.5 mm. long; stigma capitate, discoid to slightly bifid; ovules 15-25 in each loculus; seeds plump, often angular, wingless, mucilaginous when wetted, 1.1-1.3 mm. long, ca. 0.75 mm. broad; cotyledons incumbent to accumbent.

Herba annua; caulibus erectis ramosis pubescentibus 4-6 dm. longis; foliis anguste oblongis acutis dentatis vel sinuatis ad basi cuneatis 1-nervatis dense pubescentibus; inflorescentiis racemosis elongatis; infructescentiis 1-3 dm. longis; sepalis nonsaccatis oblongis pubescentibus ca. 2.5 mm. longis, ca. 1-2 mm. latis; petalis albis obovatis 4-5 mm. longis, 2-2.5 mm. latis; pedicellis divaricatis rectis pubescentibus 6-10 mm. longis; siliquis anguste oblongis compressis carinatis pubescentibus 8-12 mm. longis, 2.5-3.5 mm. latis; loculis 15-25-ovulatis; seminibus emarginatis brunneis 1.1-1.3 mm. longis, ca. 0.75 mm. latis; cotyledonibus incumbentibus vel accumbentibus.

Type in the Gray Herbarium, collected on rocky slope, 9 miles northeast of Durango, Route 31, Durango, Mexico, 25 July, 1958, *D. S. Correll and I. M. Johnston 20149*. Isotype at the Lundell Herbarium (TRF).

Synthlipsis elata has considerably narrower siliques and very much smaller flowers than either *S. Greggii* or *S. densiflora*. The pedicels are rather rigidly divaricate and only slightly ascending, giving a somewhat rigid appearance to the infructescence. Another striking feature is the very slender style which broadens very slightly at the base where a few branched trichomes are present. The plants of *S. elata* are virgately branched, the major branches beginning just above the soil line and branching repeatedly upward and outward. The tap root is well developed, but appears not to be that of a perennial plant.

The numerous small seeds are crowded in the loculi of the siliques and the shape of each seed is somewhat determined by pressure from adjacent seeds. This crowding also affects the position of the cotyledons with respect to the radicle. They are basically incumbent but often are crowded into an oblique to nearly accumbent position.

S. elata differs from *S. Greggii* and *S. densiflora* in having numerous seeds and incumbent cotyledons. In these features, it is more like *Nerisyrenia* than the other species of *Synthlipsis*.

2. **Synthlipsis Greggii** Gray, Mem. Am. Acad. 4:116. 1849.

Annual or biennial, possibly perennial; stems numerous from a slender or thickened caudex, densely covered with whitish dendritically branched trichomes, simple below, branched above, weak, often decumbent or sprawling in nearby bushes, 2-7 dm. long; leaves petiolate, densely pubescent with multiple-branched trichomes, mid-vein conspicuous; basal and cauline leaves basically similar; basal leaves with a slender petiole, broadly oblong or obovate to nearly spatulate, acute to somewhat rounded at apex, deeply dentate to nearly entire, 2-14 cm. long, 1-4 cm. wide; cauline leaves short-petiolate to cuneate at base and nearly sessile, oblong to broadly obovate, deeply lobed to shallowly dentate, acute to somewhat rounded at apex, 1-6 cm. long, 5-30 mm. wide; inflorescence much elongated, 1-4 dm. long; sepals narrowly oblong, nonsaccate, densely pubescent, 5-8 mm. long, 1.5-2 mm. wide; petals white to violet, broadly obovate, 9-12 mm. long, 6-9 mm. wide; filaments slender, not dilated at base; anthers oblong, 3-3.5 mm. long; fruiting pedicels widely spreading to slightly recurved, often somewhat sigmoid, 5-15 mm. long, slightly flattened in same plane as fruit, densely pubescent; siliques strongly flattened at right angles to replum, carinate-margined, elliptical to broadly oblong, densely pubescent, 8-15 mm. long, 5-8 mm. wide, apical notch shallowly to deeply U-shaped, more rarely V-shaped; styles slender, glabrous, 2-5 mm. long; ovules 7-11 in each locule; seeds plump, wingless, slightly longer than broad, 1.5-2 mm. long; cotyledons accumbent.

KEY TO VARIETIES

Siliques more or less uniformly pubescent with multiple-branched short-stalked trichomes ..... 2a. var. *Greggii.*
Siliques hispid with long-stalked trichomes and pubescent with an understory of multiple-branched short-stalked trichomes ..... 2b. var. *hispidula.*

2a. **S. Greggii** var. **Greggii.** Fig. 2A-2F.

Variety *Greggii* is distributed from southwestern Texas south and west into Mexico, reaching the southern extremity of its known range in Hidalgo and its westward limit in the state of Durango. The area of occurrence in Hidalgo in

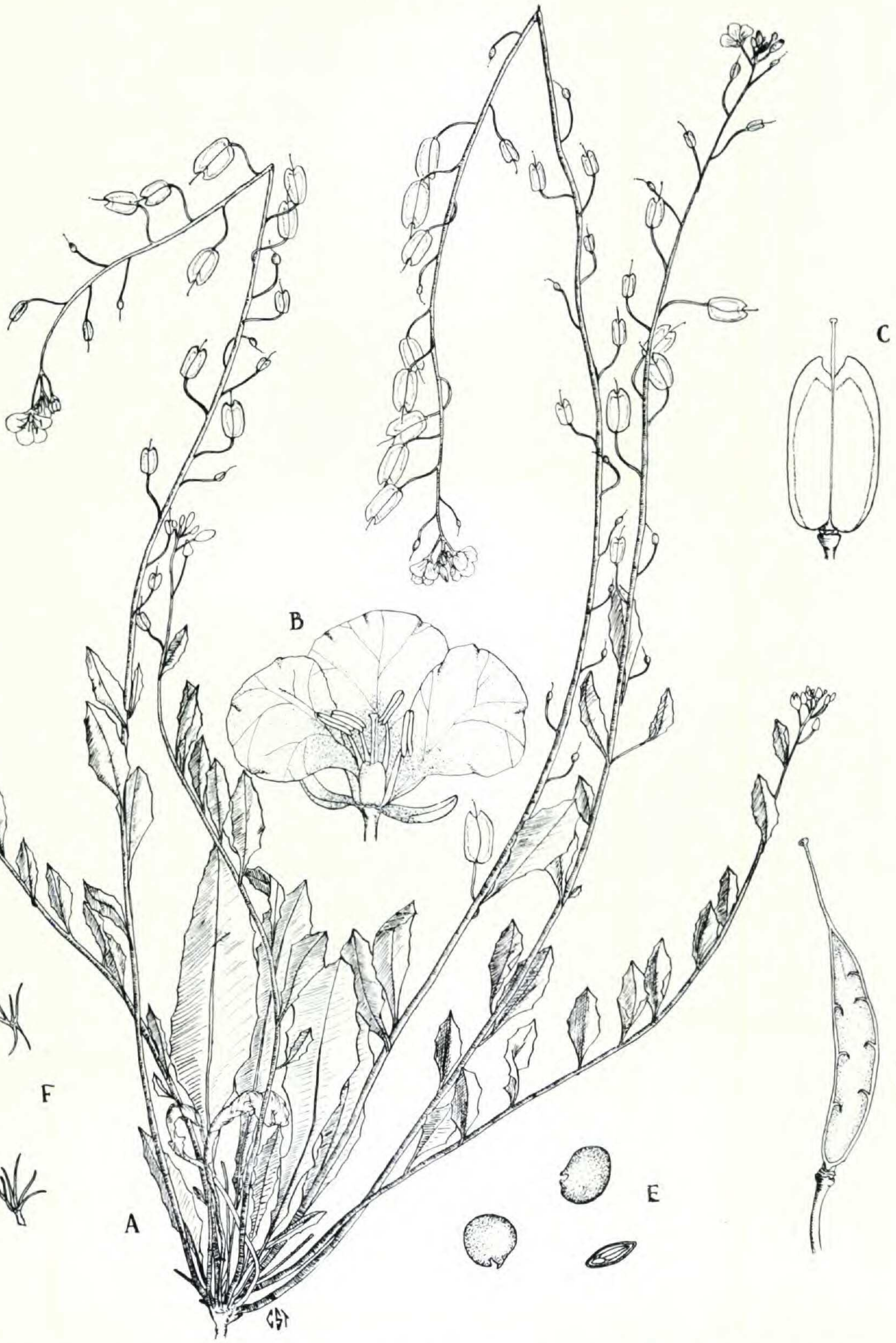

FIG. 2. *Synthlipsis Greggii* Gray. A — habit sketch, × ½; B — flower with some parts removed, × 2; C — mature silique, × 2; D — replum, × 3; E — seeds, × 2.5. one seed in cross-section to show cotyledon position; F — trichomes, × 25.

the district of Ixmiquilpan appears to be isolated from the main distributional area of the species. This disjunction parallels that of other plant species, such as *Parthenium argentatum*, and apparently is not uncommon. Var *Greggii* is unusually variable in many morphological features and this variability may be associated with wide seasonal fluctuations in moisture and temperature. It flowers and fruits over a very long time-span, depending upon seasonal conditions, and the continued growth of any given plant appears to be under moisture control rather than seasonal domination. This is shown by the dates of collection of the 38 specimens in the Gray Herbarium. According to these, flowering or fruiting specimens were collected in every month of the year except December, and the absence of the latter month from the roster is probably pure chance. The number of collections taken in each month are as follows: Jan., 1; Feb., 3; Mar., 2; Apr., 4; May, 3; June, 3; July, 5; Aug., 4; Sept., 3; Oct., 4; Nov., 6. Taking the full geographic range of the species into account, there is no regular dormant season as far as growth is concerned and no period when flowering may not occur under appropriate conditions.

As a result of its tendency to grow whenever the moisture regime is favorable, *S. Greggii* may grow continuously for many months, producing greatly elongated flowering stems. On the other hand, a short moist period followed by a long dry one produces a short growth period which is followed by the slowing down and cessation of growth and a relatively dwarfed plant results. These extremes in the overall growth pattern are paralleled by leaf-size and other deviations which must be taken into account in any assessment of the variation of the species as a whole.

Growing in open ground, *S. Greggii* has a central tuft of basal leaves with decumbent sprawling stems that arise in their axils. Because the stems are weak and lie along the ground, the cauline leaves are oriented to the upper side of the stem, even though they are borne alternately. In heavily grazed areas, the plants of *S. Greggii* survive through the

protection of spiney bushes and cactus clumps where the stems are enmeshed among the branches or spines of the protecting clump.

Some populations of *S. Greggii* have pure white flowers. These usually become pale pink upon drying. But the commonest flower color is a light to dark shade of violet. Upon drying, the petals of many of these flowers become very deep violet in color.

In addition to the collections cited in my earlier paper (1939), the following have been studied: — **Texas**: Maravillas Creek, 44 miles southeast of Marathon, Brewster Co., *Cory 31618* (GH); between Persimmon Gap and Dog Flat, Brewster Co., *Warnock C293* (GH); La Joya, Hidalgo Co., *Mrs. E. J. Walker 27* (GH). **Mexico — Chihuahua:** Cañon del Rayo, Sierra del Diablo, *Stewart 854* (GH). **Tamaulipas:** San Fernando, *Berlandier 811* (GH). **Nuevo Leon**: 5 miles west of Santa Catarina toward Saltillo, *Rollins & Tryon 5893* (GH); south of La Paz, 80 miles south of Saltillo, *Rollins & Tryon 58171* (GH); near Pablillo, *Shreve & Tinkham 9746* (GH); 29 miles northeast of Saltillo on road to Monterrey, *Rollins & Tryon 58311* (GH). **Coahuila**: about 4 miles east of Carneros Pass, *Correll & Johnston 21328* (GH, TRF); south of Castaños, *Wynd & Mueller 201* (GH); Cañon de Jara, east of Socorro, *Schroeder 15* (GH); western base of Pecacho del Fuste, *Johnston 8427* (GH); 9 km. south of Parras, *Stanford, Retherford & Northcraft 152* (GH); 13 km. east of Jimulco, *Stanford, Retherford & Northcraft 112* (GH); Sierra del Pino, *Johnston & Muller 392; 756* (GH); 2 km. west of Las Margaritas, *Stewart 2844* (GH); Valle de Acatita, *Stewart 2997* (GH). **Durango**: Trancas Canyon, about 7 miles southeast of Chocolate, *Correll & Johnston 20015* (GH, TRF); 74 miles northeast of Durango, *Rollins & Tryon 58280* (GH); between Guadalupe Victoria and Cuencame, 87 miles northeast of Durango, *Rollins & Tryon 58283* (GH). **San Luis Potosi**: 50 miles northeast of San Luis Potosi, *Rollins & Tyron 58200* (GH). **Hidalgo:** between Ixmiquilpan and river cut on road to Cardonal, *Moore & Wood 3728* (GH).

2b. **S. Greggi** var. **hispidula** Rollins, Madroño **5**:133. 1939.

We have seen this variety growing on limey gravel 16 km. southeast of San Luis Potosi where we were led by Dr. Jerzy Rezdowski in November, 1958. The plants have the hispid siliques and broad replum of the type specimen, but I cannot find any other characters to distinguish them from var. *Greggii*. In the same area we found *Lesquerella Schaffneri*,

whose type Schaffner also obtained in the area around San Luis Potosi, probably in the San Miguelito Mountains, which was one of his favorite collecting grounds. Our collection is *Rollins & Tryon 58208* (GH).

3. **Synthlipsis densiflora** Rollins, sp. nov. Fig. 3A-3E.

Perennial, caespitose; root caudex thick and often clothed with old leaf-bases; stems erect to somewhat decumbent, usually branched above, densely pubescent with irregular dendritic trichomes, arising from the crown amid a cluster of erect petiolate leaves, 1-2 dm. long; basal leaves petiolate, irregularly dentate to somewhat lobed, 5-10 cm. long, 2-4 cm. wide, pubescent throughout with dendritic trichomes, blade obovate to broadly elliptical, obtuse at apex; cauline leaves cuneate to obovate, usually petiolate, sparsely dentate, obtuse at apex, densely pubescent, 1.5-4 cm. long, 8-20 mm. wide, often subtending branches; inflorescence dense, terminating the main axes and the branches; sepals densely pubescent, narrowly oblong, ca. 5 mm. long, ca. 1 mm. wide, outer pair slightly saccate, inner pair nonsaccate; petals obovate with a slender claw, white, 7-9 mm. long, ca. 4 mm. wide; stamens shorter than petals; anthers ca. 2 mm. long; fruiting pedicels straight, at right angles to rachis to slightly ascending, densely pubescent, 5-10 mm. long, somewhat expanded at summit; siliques oblong to elliptical in outline, notched at apex, densely pubescent, strongly flattened at right angles to the septum, 8-15 mm. long, 5-8 mm. wide, trichomes of the valves of markedly different sizes; valves glabrous on interior; sinus at apex of silique V-shaped, 1-2 mm. deep; replum glabrous, acute at apex; styles slender, glabrous, 1-2 mm. long; seeds plump, somewhat pear-shaped, wingless, ca. 1.2 mm. long; position of cotyledons not determinable from the available material.

Herba perennis caespitosa; caudicibus crassis; caulibus erectis vel decumbentibus ramosis pubescentibus 1-2 dm. longis; foliis radicalibus petiolatis dentatis vel sinuatis obovatis vel ellipticis obtusis dense pubescentibus 5-10 cm. longis, 2-4 cm. latis; foliis caulinis cuneatis vel obovatis 1.5-4 cm. longis, 8-20 mm. latis; inflorescentiis densis; sepalis anguste oblongis pubescentibus ca. 5 mm. longis, ca. 1 mm. latis; petalis obovatis vel late spathulatis albis 7-9 mm. longis, ca. 4 mm. latis; pedicellis rectis divaricatis pubescentibus 5-10 mm. longis; siliquis late oblongis vel ellipticis compressis dense pubescentibus 8-15 mm. longis, 5-8 mm. latis; stylis tenuibus glabris 1-2 mm. longis; loculis 6-8-ovulatis; seminibus pyriformibus exalatis.

Type in the Gray Herbarium collected from crevices of limestone on

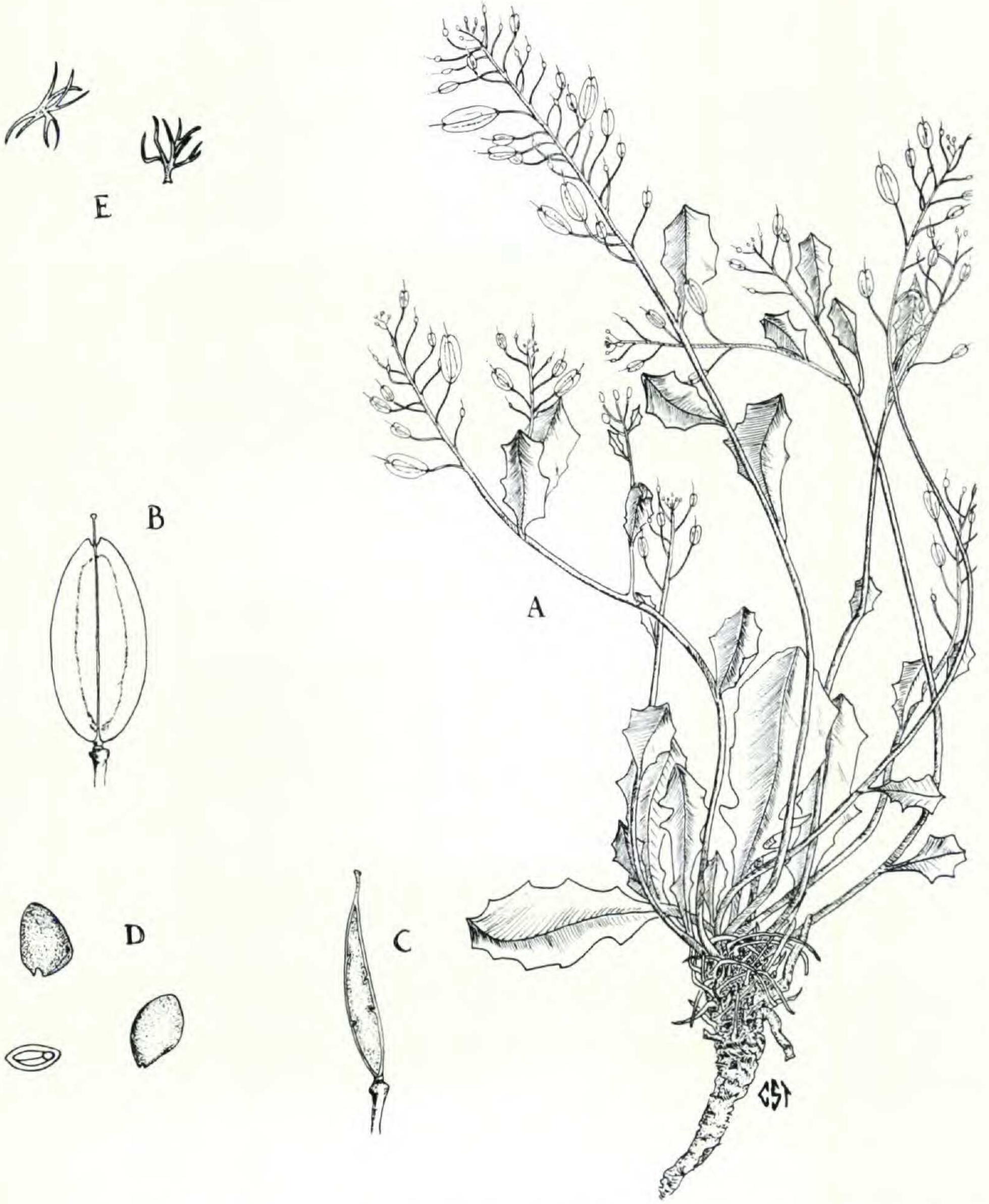

FIG. 3. *Synthlipsis densiflora* Rollins. A — habit sketch, × ½; B — mature silique, × 2; C — replum, × 2; D — seeds, × 5, one seed in cross-section to show cotyledon position; E — trichomes, × 25.

exposed high west-facing cliffs just below the ridge-crest, southwestern end of the Sierra de la Fragua, a high limestone ridge with a forest of *Pinus pinceana*, 1-2 km. north of Puerto Colorado, western Coahuila, Mexico, Sept. 2, 1941, *I. M. Johnston 8740*.

Synthlipsis densiflora is at present known only from the type series which in itself shows considerable variation. For one thing, there is an unusual amount of abortive fruit on several of the specimens, but even taking this into account, the variation in the siliques, both as to length and width, is remarkably great. The plants as a whole vary greatly in size and one suspects that the cliff-crevices where they were found were not uniformly favorable for growth. The dense cluster of basal leaves and thick caudex invested with old leaf-bases, as found in *S. densiflora*, often characterize plants of cliff-crevices in arid areas and it is interesting to have a species of *Synthlipsis* adapting itself to this particular habitat. *S. densiflora* is most closely related to *S. Greggii* and differs from it mainly in the shape of the silique, the fact that it is a heavy rooted perennial, and in the short, dense inflorescence. Also, the flowers are smaller and the styles are shorter in *S. densiflora* than in *S. Greggii*. — GRAY HERBARIUM OF HARVARD UNIVERSITY.

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